

Name: _____

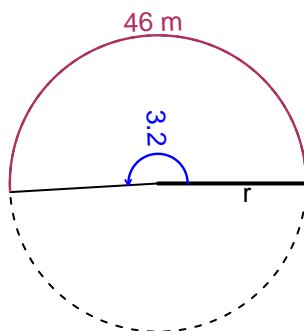
Date: _____

Trig Final (Solution v38)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 46 meters. The angle measure is 3.2 radians. How long is the radius in meters?

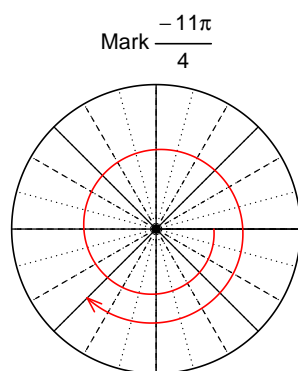


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$r = 14.38$ meters.

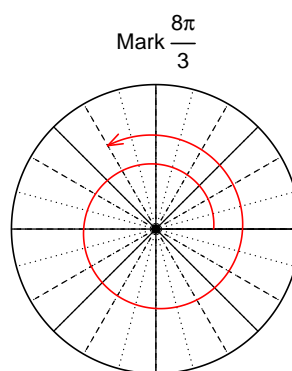
Question 2

Consider angles $-\frac{11\pi}{4}$ and $\frac{8\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(-\frac{11\pi}{4}\right)$ and $\sin\left(\frac{8\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\cos(-11\pi/4)$

$$\cos(-11\pi/4) = \frac{-\sqrt{2}}{2}$$



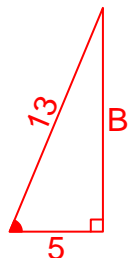
Find $\sin(8\pi/3)$

$$\sin(8\pi/3) = \frac{\sqrt{3}}{2}$$

Question 3

If $\cos(\theta) = \frac{5}{13}$, and θ is in quadrant IV, determine an exact value for $\tan(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



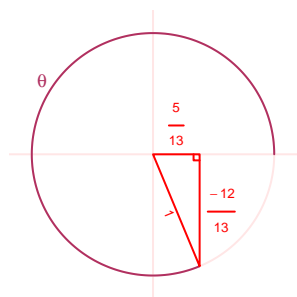
Solve the Pythagorean Equation

$$5^2 + B^2 = 13^2$$

$$B = \sqrt{13^2 - 5^2}$$

$$B = 12$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\tan(\theta) = \frac{\frac{-12}{13}}{\frac{5}{13}} = \frac{-12}{5}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.33 Hz, an amplitude of 7.18 meters, and a midline at $y = -8.44$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 7.18 \sin(2\pi 3.33t) - 8.44$$

or

$$y = 7.18 \sin(6.66\pi t) - 8.44$$

or

$$y = 7.18 \sin(20.92t) - 8.44$$